

Work Order ID 85368

\*85368\*

Page 1

June-07-12 9:17:35 AM

Item ID: D412-664-203

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Aft

Start Date: 07/06/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/06/07 Tooling:

Date:

Run Start \*NR1\*

QC:

Date: SPC (Y/N):

Date:

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D412-664-243

E/DEO

SP

100

0.00

\*100\*

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 008

8/26/07

12/7/5

110

0.00

\*110\*

Packaging

Packaging

Memo

0.00

Packaging

JW 12-6-12

120

0.00

\*120\*

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D412-664-243 using CNC bender program 412-aft and Folio FT010

12/6-13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

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Revision ID:

Item Name: Crosstube Aft

Stop **\*NS2\***

Start Date: 07/06/2012 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: Date: Tooling: Date:  
QC: Date: SPC (Y/N): Date:

Run Start **\*NR1\***  
Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130 <b>*130*</b> QC Quality Control	QC15- Crosstube Dimensional Check  Memo	0.00 0.00		8176113		(X)			
140 <b>*140*</b> Crosstubes Crosstubes	Crosstubes  Memo 1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551 and drill table DT8577 using #9 holes as per QSI 10 to install towers.  2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.  3-SCRIBE PART # & BATCH #  4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243	0.00 0.00							

MO 12-6-14  
MO 12-6-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

150

Crosstubes Chemical Conversion

0.00

**\*150\***

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

*Rm 12-6-26 P10 →*

160

QC3- Inspect Part Finish

0.00

**\*160\***

QC

Memo

0.00

Quality Control

*① 12/26/26 P10 →*

170

QC5- Inspect part completeness to step on W/O

0.00

**\*170\***

QC

Memo

0.00

Quality Control

*8/7/2012*

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
12/06/15	#150	move steps #150 + 160 to after step #200. Due to corrosion issue.					S 12/06/15	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Required Date: 21/06/2012 Req'd Qty: 1.00

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Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

180

Outsource process - NDT per QSI038 4.1

0.00

**\*180\***

Outsource2

Memo

0.00

Outsource process - NDT

Liquid Penetrant Inspection as per QSI 038 Or  
Issue P/O: ~~17258~~ LPI as per ASTM 1417  
Level 2 Attach copy of NDT results to work order

*CL 12/06/19 ①*

190

Packaging

0.00

**\*190\***

Packaging

Memo

0.00

Packaging

Inspect for transit damage  
Ensure copy of NDT results attached to work order.

*P 12/4/19*

200

QC5- Inspect part completeness to step on W/O

0.00

**\*200\***

QC

Memo

0.00

Quality Control

Inspect for damage & ensure results are as per Dwg D412-664-203

1

*W 12.06.19*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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**\*NS2\***

Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

**\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop

**\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	SprayPaint	0.00							
<b>*210*</b>									
SprayPaint	Memo	0.00							
Spray Painting	***Mask underside of crosstube as shown***								
	1-Prime inside and outside crosstube as per QSI 005 4.2								
	2-Paint outside crosstube with White Imron as per DEO D412-664-243 and QSI 005 4.2								
	PRIME: 121746								
	Start Time: 2:15								
	Finish Time: 3:00								
	PAINT: 120985								
	Start Time: 6:20								
	Finish Time: 7:05								
	Clear: 121687								
	Start: 3:30								
	Finish: 4:20								
220	QC14- Inspect Spray Paint	0.00							
<b>*220*</b>									
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								

12-6-30

12-6-27

12-6-30

12-6-30

12-07-01

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Stop **\*NS2\***

Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

230

0.00

**\*230\***

Crosstubes

Crosstubes

Memo

0.00

Crosstubes

Assemble as per Dwg D412-664-203

1- Install chafing shield as per DEO D412-664-243. Top holes should be facing up.

A/R Proseal 890 Batch: 121287  
EXP: 11/12

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

3- Install support with Scotch-Weld DP460 and install clamps as per DEO Dwg D12-664-243 using installation jig DT9024. Torque clamps as per dwg

A/R Scotch-Weld DP460 Batch: 120398  
EXP: 14 Mar. 2013

12-7-1

240

QC5- Inspect part completeness to step on W/O

0.00

**\*240\***

QC

Memo

0.00

Quality Control

1 120704

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Setup Start \*NS1\*

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Start Date: 07/06/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

250

Pick Kit

0.00

\*250\*

Packaging

Memo

0.00

Packaging

1x 12-7-5

260

QC4- 100% Inspect kits for completeness

0.00

\*260\*

QC

Memo

0.00

Quality Control

5/26/10

(x)

270

Packaging

0.00

\*270\*

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPP D412-664-203  
\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 27  
for application time & date \*\*\*\*\*  
Time & date of packaging: \_\_\_\_\_  
Location: \_\_\_\_\_

Smith

10/10/10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Setup Start **\*NS1\***

Revision ID:

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Item Name: Crosstube Aft

Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID Tool # Plan  
Code

Accept Reject Reject Insp.  
Qty Qty Number Stamp

280

QC21- Final Inspection - Work Order Release

0.00

**\*280\***

QC

Memo

0.00

Quality Control

12/7/5

mf

12-07-05

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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# Picklist Print

June-07-12 9:17:39 AM

Page 1

Work Order ID: 85368

**\*85368\***

Parent Item: D412-664-203

**\*D412-664-203\***

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

## Comments:

IPP Rev:E04.02.16Reformat; Added D3189-1K/DS  
 IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
 IPP Rev:G 06.12.08 per ECN 886 EC  
 IPP Rev:H 07-04-30 As per Rev D JLM  
 IPP Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC IPP rev J  
 11.04.21 DEO D412-664-243-E-1 EC verified DD IPP REV:K  
 11.10.03 DEO D412-664-243-E-2 DD ver:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D412-664-203TRN

Manufactured No

110

Each

2.0000

1

1

**\*D412-664-203TRN\***

\*\*

Crosstube Turning Detail

Location	Loc Qty	Loc Code
LG	2	
83807	1	
83808	1	

D2896-1

Manufactured No

230

Each

22.0000

1

1

**\*D2896-1\***

\*\*

Support

71502/74465

Location	Loc Qty	Loc Code
LG052	8	
80586	8	
LG053	14	
74465	14	

D3189-1

Manufactured No

230

Each

16.0000

2

2

**\*D3189-1\***

\*\*

Chafing Shield

Location	Loc Qty	Loc Code
FG	4	
36065	4	
LG053	12	
83972	12	

① JW 12-6-12

① AB 12-7-1

AB 12-7-1

②

W/O:		WORK ORDER CHANGES					
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Parent Item: D412-664-203

**\*D412-664-203\***

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

D3595-063-570

Manufactured No

230

Each

153.0000

2

2

**\*D3595-063-570\***

\*\*

AR 12-7-1

RUBBER CUSHION

Location

Loc Qty

Loc Code

FG

8

37971

1

42243

7

LG

78

83294

78

MAT052

67

71534

1

76546

66

2

MS21920-28

Purchased

No

230

Each

71.0000

4

4

**\*MS21920-28\***

\*\*

AR 12-7-1

Clamp(per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

FG

5

105884

5

LG050

50

116839

2

118713

4

120054

2

121067

42

4

LG051

16

121440

16

W/O:		WORK ORDER CHANGES					
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Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

MS21920-30

Purchased

No

230

Each

101.0000

2

2

\*MS21920-30\*

clamp(per MIL-DTL-8783C)

\*\*

12-7-1

## Location

## Loc Qty

## Loc Code

LG

38

119529

38

LG051

63

111258

14

121583

49

AN6-40A

Purchased

No

250

Each

156.0000

4

4

\*AN6-40A\*

Bolt

\*\*

## Location

## Loc Qty

## Loc Code

ST342

156

120187

66

120833

4

121349

11

121584

25

121827

50

AN6-41A

Purchased

No

250

Each

81.0000

2

2

\*AN6-41A\*

Bolt

\*\*

## Location

## Loc Qty

## Loc Code

ST342

81

119749

1

120423

50

121825

30

AN960JD616

NAS1149D0663J

Purchased

No

250

Each

0.0000

18

18

\*AN960JD616\*

Washer

\*\*

m121444  
SP 12-7-5

June-07-12 9:17:39 AM

Shop Packet Print

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

MS21042L6

Purchased

No

250

Each

648.0000

\*MS21042L6\*

Nut



6

SP 12-7-5

Location

Loc Qty

Loc Code

ST300

648

117677

25

118384

3

118927

48

119075

372

120308

200

Cox

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

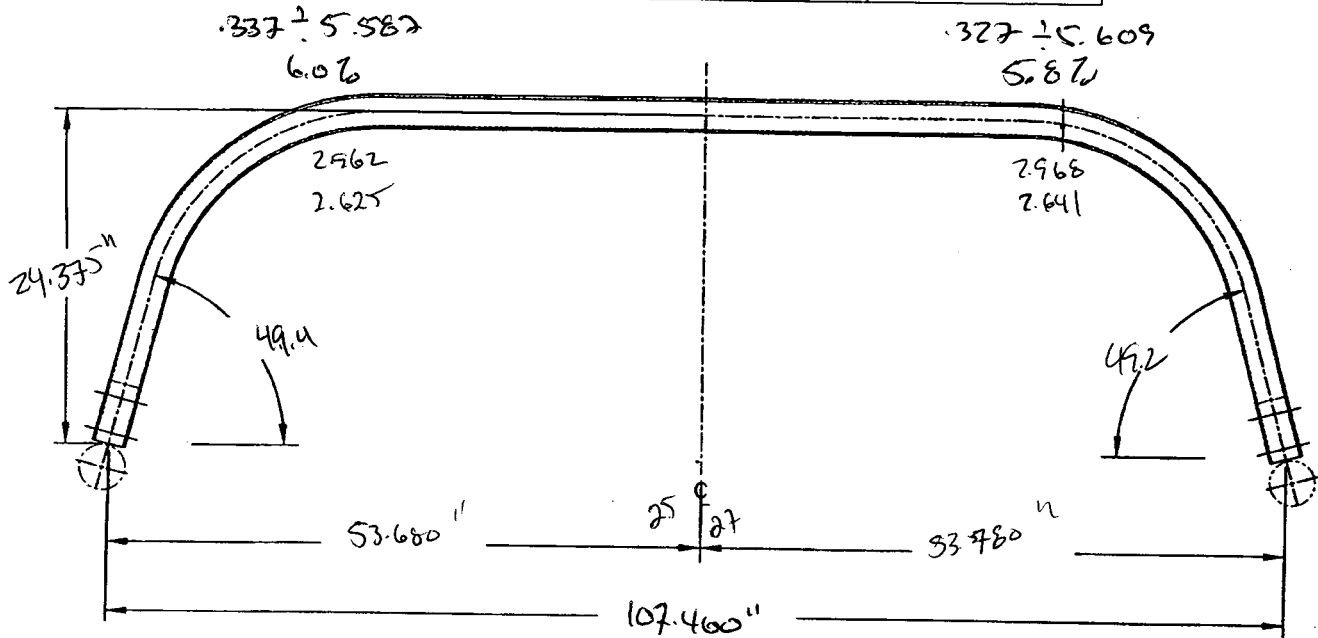
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DART AEROSPACE LTD		Work Order:	85368
Description: Crosstube High Aft (412)		Part Number:	D412-664-203
Inspection Dwg: D412-664-243	Rev: E		Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments
SIDE A = $6.06$ crushing @ 25 Passes
SIDE B = $5.87$ crushing @ 27 Passes

QC15 Inspection	8
Date	12/06/13

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM	
C	10.02.02	Dwg Rev updated	KJ	

Item	Qty	Part Number	Description
	-243		
1	X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
6	2	D2856-600-1009	ABRASION STRIP
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 47.0 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT

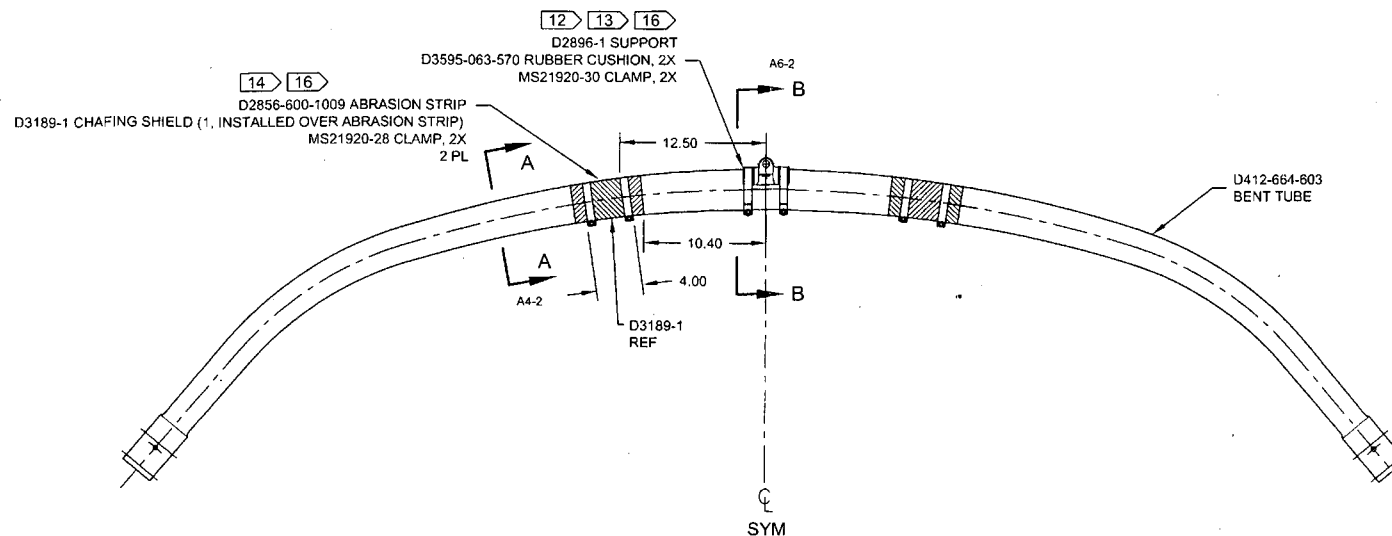
WITHOUT NOTICE  
WORK ORDER  
NO. ES368 MLC

12/06/07

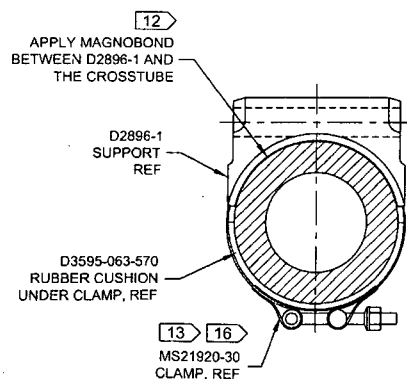
② DEO ATTACHED

RELEASED  
2009-10-29

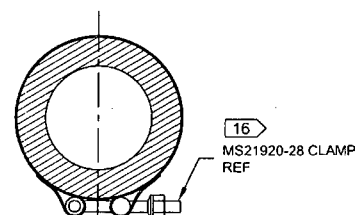
E	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.09.30
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
C	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30	MB	06.10.27
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	01.10.17
REV.	DESCRIPTION	BY	DATE
DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	PH	DRAWING NO.	REV. E
MFG. APPR.	PH	D412-664-243	SHEET 1 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	



**D212-664-243**  
**ASSEMBLY DETAIL**



**SECTION B-B** D4-2  
SCALE 4X



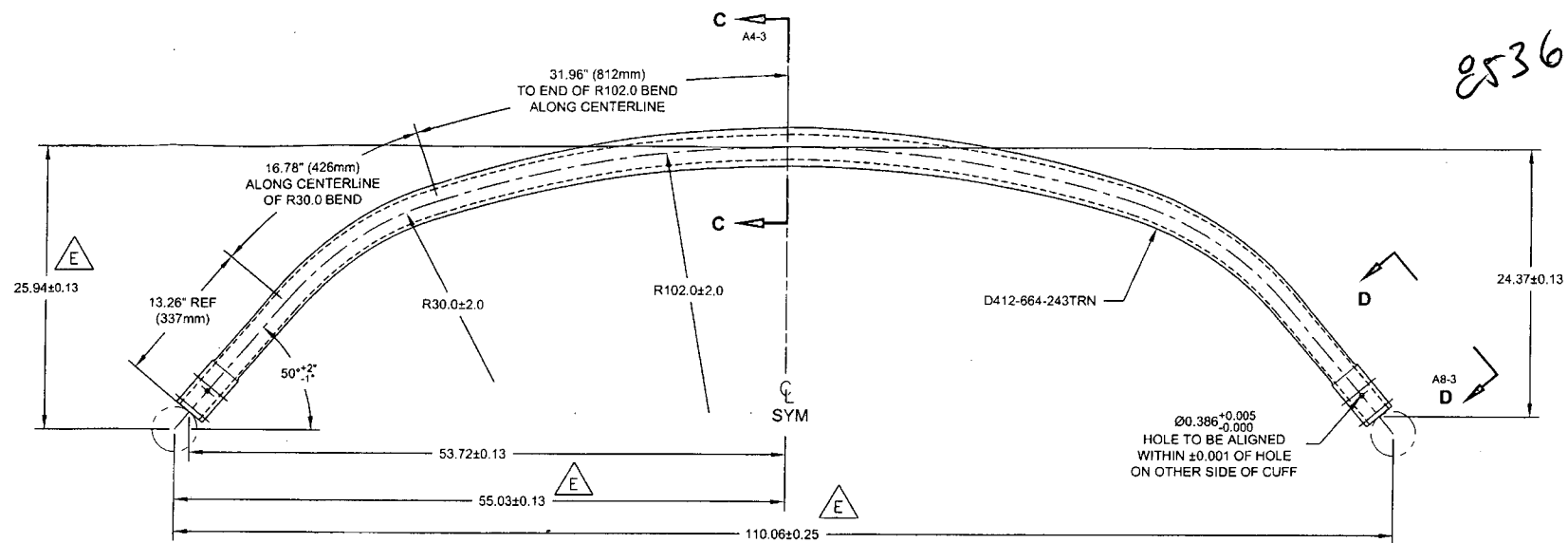
**SECTION A-A** C6-2  
SCALE 4X

2 DEO ATTACHED

**RELEASED**  
2009-10-28

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9	DRAWING NO.	REV. E
MFG. APPR.	18	D412-664-243	SHEET 2 OF 4
APPROVED	18	TITLE	SCALE
DE APPR.	18	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

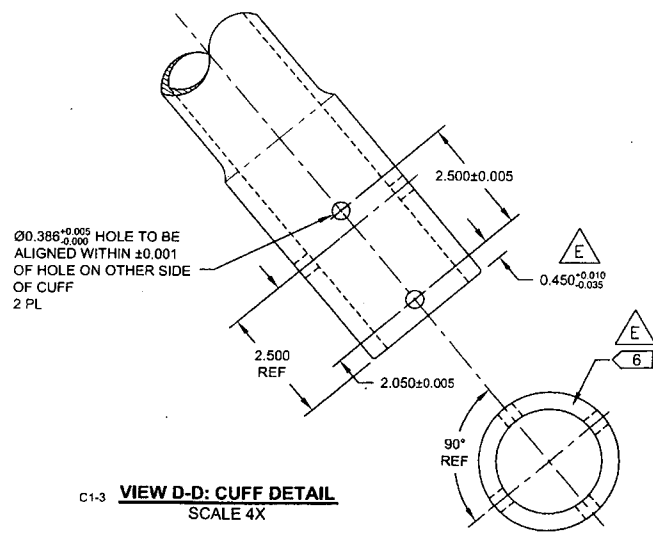
25368



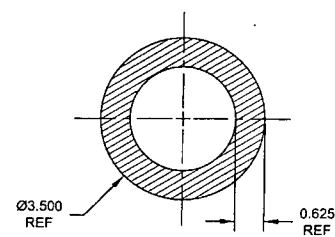
**D412-664-603** 10  
**BENDING AND DRILLING DETAIL** E

② DEO ATTACHED

**RELEASED**  
 2009-10-29  
 MP



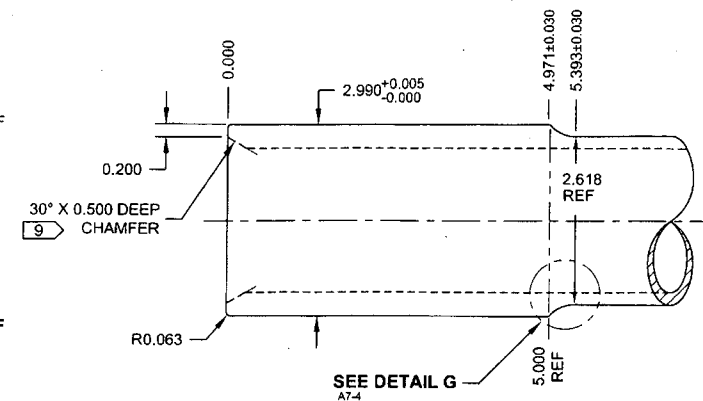
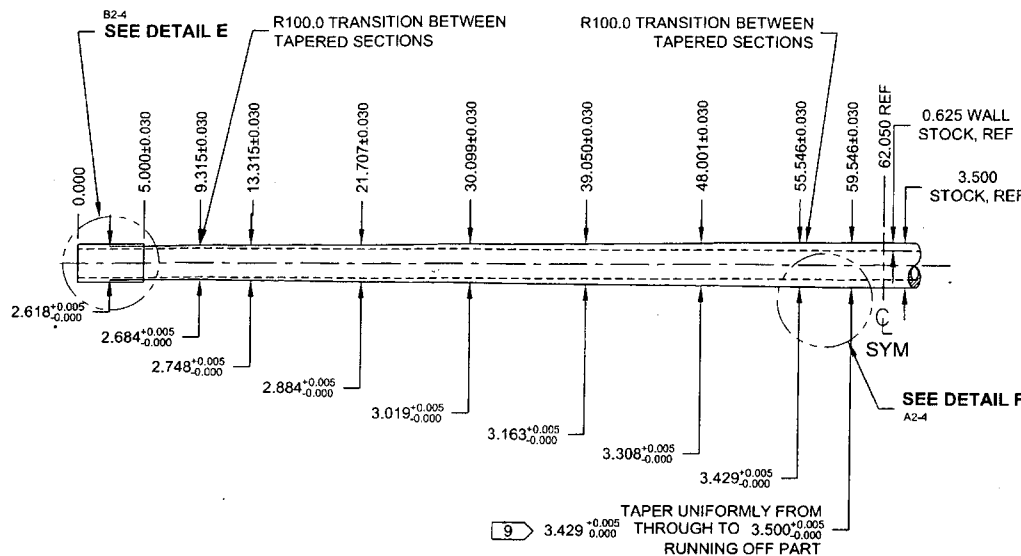
**VIEW D-D: CUFF DETAIL**  
 SCALE 4X



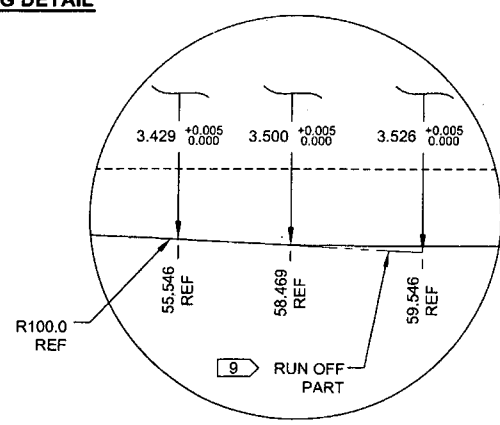
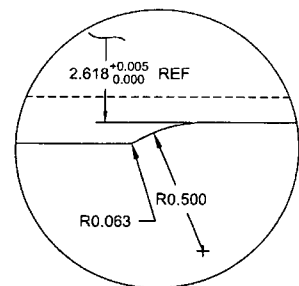
**SECTION C-C** D5-3  
 SCALE 4X

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. E
MFG. APPR.	SS	D412-664-243	SHEET 3 OF 4
APPROVED	AP	TITLE	SCALE
DE APPR.	H	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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25368



**D412-664-243TRN**  
**TURNING DETAIL**



DEO ATTACHED  
**RELEASED**  
2009-10-29  
NTP

DESIGN	PH	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	PH	DRAWING NO.	REV. E
MFG. APPR.	PH	D412-664-243	SHEET 4 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL. IT IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

DRAWING NO. D412-664-243	TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	REV. E	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D412-664-243-E-1	SHEET NO. SHEET 1 OF 2	SCALE NTS
DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.			
DATE 11.03.31	DATE 11/03/31	DATE 11.03.31	DATE 11/03/31	DATE 11-03-31			

**PURPOSE:**

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

**CHANGE:**

PARTS LIST IS AMENDED AS FOLLOWS:

**IS:**

Item	Qty -243	Part Number	Description
6	0	D2856-600-1009	ABRASION STRIP

**WAS:**

6	2	D2856-600-1009	ABRASION STRIP
---	---	----------------	----------------

NOTES 2 AND 14, SHEET 1 ARE AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)  
PAINT OUTSIDE PER DART QSI 005 4.2  
AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA
- 14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1  
CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL  
PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF  
PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF  
CROSSTUBE PER QSI 035.

RELEASED  
2011-04-07  
MB

DRAWING NO. D412-664-243	TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	REV. E	DART AEROSPACE LTD ENGINEERING ORDER	D.E.O. NO. D412-664-243-E-1	SHEET NO. SHEET 2 OF 2	SCALE NTS
DRAWN <i>MD</i>	CHECKED <i>MD</i>	MFG. APPR. <i>EE</i>	APPROVED <i>MD</i>	DE APPR. <i>MD</i>		
DATE 11.03.31	DATE 11.03.31	DATE 11.03.31	DATE 11.03.31	DATE 11.03.31		

25368

IS:

D3189-1 CHAFING SHIELD (1, INSTALLED OVER PROSEAL 890)  
MS21920-28 CLAMP, 2X  
2 PL

WAS:

D2856-600-1009 ABRASION STRIP  
D3189-1 CHAFING SHIELD (1, INSTALLED OVER ABRASION STRIP)  
MS21920-28 CLAMP, 2X  
2 PL

D412-664-603  
BENT TUBE

D3189-1  
REF

D412-664-243  
ASSEMBLY DETAIL

RELEASED  
2011-04-07  
*MD*

MASK AREA PRIOR TO PAINTING AND  
APPLY CLEAR COAT AFTER PAINTING

Q  
SYM

DRAWING NO. D412-664-243	TITLE CROSSTUBE ASS'Y (412 HI AFT)	REV. E	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D412-664-243-E-2	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>MP</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>RE</i>	APPROVED <i>MP</i>		DE APPR. <i>MP</i>		
DATE 11.09.07	DATE 11.09.19	DATE 11.09.19	DATE 11.09.19		DATE 11.09.19		

**PURPOSE:**

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

**CHANGE:**

IS:

Item	Qty -243	Part Number	Description
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD

WAS:

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	----------------	---

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.**

WAS:

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-09-29  
*MP*





## 5.0 PARTS LIST

## 5.1 HIGH GEAR CROSSTUBES

Item	-101	-201	-203	Part Number	Description
	X			D212-664-101	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
		X		D212-664-201	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
			X	D412-664-203	CROSSTUBE INSTALLATION, 412 HIGH AFT
1	1			D212-664-141	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
2		1		D212-664-241	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
3			1	D412-664-243	CROSSTUBE ASSEMBLY, 412 HIGH AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
50	1	1		D3428-1	PLACARD

\*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-141/-241 OR D412-664-243 ASSEMBLIES ABOVE  
NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI  
SKIOTUBES.



## LIQUID PENETRANT TEST REPORT

P- 12185

PAGE 1 OF 1

CLIENT DART Aerospace DATE 09/19/2012 TIME AM ☒ PM ☐  
ATTENTION: WATT/LINDA ACUREN JOB NO. 188-12-C0265  
ADDRESS 1770 ABENDEEN ST. PO/NO NO. 17258  
HAWKESBURY ON. WORK LOCATION Same  
ACCEPTANCE STD ASME 1417/01-03 REV./DATE 2005  
OBJECT F.P.I. ON CROSS TUBES  
ITEM(S) EXAMINED SEE RESULTS

JOB DESCRIPTION		PROCEDURE NO. <u>LT-002</u> REV./DATE <u>7008</u>		TECHNIQUE NO. <u>LT-002</u> REV./DATE <u>7008</u>	
PART NO.	<u>CROSS TUBES - SEE RESULTS</u>		MATERIAL	<u>Aluminum</u>	
SCOPE	<u>A DET FLUORESCENT LIQUID PENETRANT INSPECTION WAS</u>		THICKNESS	<u>Various</u>	
<u>CARRIED OUT ON THE 100% EXTERNAL SURFACE.</u>					
TEST DETAILS					
METHOD		<input checked="" type="checkbox"/> FLUORESCENT <input type="checkbox"/> VISIBLE		<input checked="" type="checkbox"/> WATER WASH <input type="checkbox"/> SOLVENT REMOVABLE <input type="checkbox"/> POST EMULSIFIED	
FAMILY BRAND		<u>AKA FLUX</u>		BLACK LIGHT S/N <u>16459</u> <input checked="" type="checkbox"/> OUTPUT > 1000 $\mu$ W/cm <sup>2</sup> <input type="checkbox"/> AMBIENT < 2 fc	
PENETRANT		<u>2467</u> MINIMUM DWELL TIME <u>45</u> MIN.		LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE	
PENETRANT REMOVER		<u>420</u> MINIMUM DRY TIME <u>&gt;10</u> MIN.		OTHER <u>LABING</u>	
DEVELOPER		<u>SKD 52</u> MINIMUM DWELL TIME <u>10</u> MIN.		LIGHT METER S/N <u>1038866</u> CAL DUE DATE <u>7-19-2012</u>	
DEVELOPER TYPE		<input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY			
TEST SURFACE					
SURFACE CONDITION		<input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED <input checked="" type="checkbox"/> MACHINED <input type="checkbox"/> SHOT BLASTED <input checked="" type="checkbox"/> CLEAN BARE METAL			
SURFACE TEMPERATURE		<input type="checkbox"/> < -4°C/20°F <input type="checkbox"/> -4°C/20°F TO 10°C/50°F <input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F <input type="checkbox"/> > 52°C/125°F			
RESULTS- <input type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL					

CROSS TUBES  
W.O.#  

1	85369	✓
1	85371	✓
1	85370	✓
1	85368	✓

- REGRIND - 1 TIME

12.06.19

Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that the comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as a warranty. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE	<u>Matthew Murdoch</u>	PRINT	SIGNATURE	DTR #	<u>E-63501</u>
TECHNICIAN (SIGNATURE):	<u>Ake J. L. L. L.</u>	1 <sup>ST</sup> TECHNICIAN	2 <sup>ND</sup> TECHNICIAN	REPORT REVIEWED BY:	
NAME (PRINT):	<u>Ake J. L. L. L.</u>	CGSB LEVEL <u>II</u> SNT LEVEL <u>II</u>	CGSB LEVEL <u>II</u> SNT LEVEL <u>II</u>	NAME	INITIALS
	CGSB REG. NO. <u>6606</u>		CGSB REG. NO. <u>6606</u>		

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